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ABSTRACT

This is a report of a study designed to discover the nature of interactions between teachers and students in regular-size classes (25 or more students) and small-size classes (fewer than 18 students). It also describes the efforts of one public school to maintain smaller classes. A review of the literature and observations of 11 primary classrooms in a public-school district in southern Louisiana were used for the study. The study analyzed nonverbal behaviors of teachers and compared acknowledgement, positive example, negative example, directives, and procedural remarks (emergent categories) with institutional, task, and personal events (a priori categories). Following are some of the findings. Teachers in small-size classes used more facial expressions and more eye contact than did teachers in regular-size classes. Teachers in small classes used many more positive than negative remarks with their students. Students in the small-size classes worked more often in small groups than they did in the regular-size classes. Teachers of small-size classes generally spent more time on direct instruction than on classroom management. The study concludes that students and teachers benefit from reflective practices involving productive, nurturing interactions, which may, in part, explain higher achievement in small classes. (Contains 2 tables, 6 graphs, and 30 references.) (WFA)

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Class Size Reduction:
Implementation and Solutions

Paper Presented at Serve 2003 Research and Policy Class Size Symposium
February 25, 2003

Class Size Reduction and Beyond

Raleigh
North Carolina

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Class Size Reduction:
Implementation and Solutions

Abstract

A study was designed to discover the nature of interactions between effective teachers in regular-size classes with 25 or more students and small-size classes with fewer than 18 students. Eleven public school primary classrooms were observed and the interactions between the teacher and students were emergent and *a priori* categories to discover similarities and inconsistencies when comparing regular and small-size classes.

Administrators must consider the impact of primary classes with fewer students. Interactions are one facet of this complex environment. Students and teachers benefit from reflective practice involving productive, nurturing interactions, and thus may in part explain higher achievement in smaller classes. Information outlining one public school district's efforts to maintain smaller class size is described.

The class size conversation has gone on for many years (e.g., Achilles, 1996; Achilles, 1998a; Bourke, 1986; Mosteller, Light, & Sachs, 1996; National Education Association, 1962; National Education Association, 1977; Odden, 1990; Slavin, 1994). It may seem common sense that fewer children with one effective, certified teacher will yield higher achievement among those children. The Student/teacher Achievement Ratio (STAR), Tennessee's K-3 class-size experiment, demonstrated that student achievement would be better in classes with fewer children (Word, et al. 1990). This experiment involved more than 11,600 students and provides documentation that appropriate class size for students in grades kindergarten through third result in greater academic gains for students when compared to students in classes of 25 students or more with one teacher or in classes or 25 students or more with one teacher and one aide. This research "leaves no doubt that small classes have an advantage over larger classes in student performance in the early grades" (Finn, 1998, p. 10).

Evidence from studies, such as the Tennessee STAR experiment and later with the Lasting Benefits study, present irrefutable documentation that elementary students in small classes of 15 to 17 students are positively impacted in areas of achievement, resiliency, graduation rates, attendance and participation in higher education (Boyd-Zaharias & Pate-Bain, 2000.) Literature pertaining to lower class size and connections to teaching practices is sorely lacking (Wang & Stull, 2000). In fact, "more research is needed to tell us about the connections among teaching practices, engagement behaviors, and

academic achievement" (Finn, 1998, p. 24). The purpose of my study was to provide administrators with information concerning student/teacher interactions within the primary regular education classroom.

Researchers are still interested in what happens as smaller class size is implemented. Finn (1998) stated that in regard to smaller classes, "more research is needed to tell us about the connections among teaching practices, engagement behaviors, and academic achievement" (p. 24). The research in this document deals with the interactions between teachers and students in primary classrooms when class size is a factor (Krieger, 2001).

Clarification of the definition of class size is necessary because this terminology is often confused with pupil/teacher ratio (PTR). Class size is the actual number of students assigned to the classroom teacher and PTR is usually the number derived from dividing the number of youngsters at a school by the total number of professional personnel serving that site (Achilles& Nye, 1998; Odden, 1990). In a study of schools in 12 states Achilles, Sharp, and Finn (1998) found that the difference between class size and PTR truly exists. In fact, the difference is about 10 pupils. For example, schools reporting a class size of 24 in first grade may also report a PTR of 14:1. When demonstrating the gains that appropriate class size provides, reporting using PTR instead of class size can yield confusing results, at best. The reported PTR can misrepresent "the workload faced by a teacher in one classroom, the amount of attention the teacher gives to any one pupil, and dynamics of a small or large class that may impact on pupil participation" (Finn, 1998, p. 5). Other discrepancies are found with task induction, time on task,

engagement participation, academic individualization, diagnosis of learning difficulty, personal attention or community, use of differentiated teaching methods, inclusion of special needs students, group dynamics, classroom management and discipline factors (Achilles, Finn and others, 2000). For the purposes of this presentation, class size is defined as the actual number of students assigned to each classroom teacher.

I believe that it is the primary responsibility of each school system to help each student become an informed, productive, and responsible citizen capable of adjusting to life in our changing society. This responsibility should be undertaken with great care and concern. Noddings (1992) stated "to do this effectively requires the creation and maintenance of a trusting relationship" between the teacher and the student (p. 107). She has suggested that caring is "the very bedrock of all successful education" (p. 27). My philosophy of education includes the idea of caring and mutual respect for one another among teachers, administrators, parents, and students. Collins (1996) stated it well, saying that teachers must help all students "feel wanted and valued" (p. 150). The interactions occurring throughout the school day in the classroom can create and enhance a caring relationship or help erode and destroy a caring relationship.

According to Achilles (1977, p. 4), "teacher and pupil interaction is 'where it's at' in education." Effective teachers who show care and concern for their students should relay the caring through interactions. The classes that I observed were in a public school system in south Louisiana. Each principal had identified effective teachers having 14 to 18 students or 24 or more students. Four small-size classes

were observed; seven regular-size classes were observed. The interactions between teachers and students were recorded, transcribed, and coded to discover the categories of interactions. Transcriptions were studied to discover if the interactions found in these observations were typical of those observed previously (e.g. French & Galloway, 1970). Verbal interactions were divided into *a priori* categories of institutional, task, personal or mixed events. The emergent categories were acknowledgement, positive example, negative attention, positive attention, directives and procedural.

Teachers in the small classes were using less verbal interactions for any off-task events. They did not have to redirect their students as frequently as did the teachers in regular classes. Their comments were more often positive example or attention than were comments of the teachers in regular size classes. The teachers in small classes used more nonverbal facial expression and eye contact than did teachers in regular classes. The comments that the small-class teachers made for redirection were briefer than the other teachers' comments. The teachers in small-size classes moved around the classroom, working with the whole group of students or working with small groups as the other children worked independently. In none of the observations were the small class teachers found calling out to children across the room. However, in several instances the teachers in the regular classes spoke loudly across the room. Several of the regular-size class teachers mentioned "yelling" or speaking loud enough to be able to "get over" the noise of the students. Some of the regular-size class teacher made loud, sarcastic remarks.

Although there were more negative attention remarks in the regular-size classes than in the small-size classes, many positive examples and positive attention remarks were observed in regular-size classes. In the regular-size classes, there were more negative behaviors, requiring more positive examples to motivate the children. This would account for the small-size class teacher being able to devote communication to remarks directing more time to the task of teaching.

Negative responses are not effective in alleviating negative behaviors (Kounin & Gump, 1961). Classes with too many negative responses to students' behaviors can cause needless anxiety or resentment. Learning is pleasant for students when they are given information in a positive instead of a negative way (Good & Brophy, 1971).

Table 1 shows a comparison of the findings using the emergent categories of acknowledgement, positive example, negative example, directives and procedural remarks with the *a priori* categories of institutional, task, and personal events. Figures 1 and 2 (Appendices) graphically depict the differences in key categories between small and regular-size classes.

The nonverbal communications of each teacher were analyzed in all classrooms. The behaviors of proximity, facial expression, gesture, touch, eye contact, and posture, were seen in differing degrees from class to class and were focused in positive or negative ways on students and their performance in the classroom. I recorded the frequency of behaviors in each category, whether

Table 1. Emergent and *a priori* category comparison

Name	% Acknowledgement	% Positive Example	% Negative Attention	% Positive Attention	% Directives	% Procedural	Institutional	Task	Personal	Mixed
S1	19.4	14.0	9.1	6.2	51.2	0.0	28.3	71.3	0.4	0
S2	5.0	38.7	13.9	8.4	34.9	0.0	22.0	76.6	1.5	0
S3	12.3	8.8	7.0	5.3	66.7	0.0	21.1	78.3	0.5	0
S4	21.1	16.0	10.8	3.6	48.5	0.0	47.7	49.41	2.9	0
R1	11.0	37.0	11.0	1.4	34.2	5.5	31.6	68.3	0.0	0
R2	3.9	37.0	6.6	5.5	46.4	0.1	83.1	15.1	1.8	0
R3	13.1	28.6	32.1	4.8	21.4	0.0	64.4	35.6	0.0	0
R4	18.6	18.1	17.2	6.8	39.4	0.0	47.1	48.4	4.6	0
R5	28.8	22.0	5.1	4.2	39.8	0.0	63.3	35.1	1.6	0
R6	5.2	28.1	22.2	1.3	42.5	0.7	50.5	46.5	3.0	0
R7	28.3	22.0	26.7	1.0	22.0	0.0	52.2	41.3	6.5	0

S = small (n = 18 or fewer students)
R = regular (n = 24 or more students)

positive or negative, and then I classified the frequencies as none, few, or many in relation to all other teachers (See Table 2).

The teachers in small classes used more facial expression and more eye contact than the teachers in the regular-size classes. Many times the teachers in the small-size classes used facial expression and eye contact since they could be sure that the children with whom they were communicating were looking at them. Teachers with more students were moving around the classrooms with their students remaining at their seats. Teachers in the regular-size classes used more nonverbal communication events involving posture and proximity. Teachers in neither size category used touch a great deal. Table 2 shows how each teacher used nonverbal communication during the observation periods. Others have found that students of effective teachers who are provided a structured environment that promotes a positive climate have an opportunity for increased achievement (Gareau & Kennedy, 1991). The use of positive communication in classrooms has been shown effective in helping students feel comfortable in their work environment (Dannefer, Johnston, & Krackov, 1998; Spangler, 1997). Borich (1996) made the point that the teacher is the most important element in determining the climate of the classroom through physical arrangement and promotion of a particular style of communication. By allowing the children to express their ideas in a positive environment, the children feel more at ease. They will attempt tasks that are challenging, knowing that they are in a safe place to try again if their attempts are not successful the first time. Although student behavior was not coded in this study, the teachers in the small-size classes did use many more positive than

Table 2. Nonverbal Communication Behavior Frequency

Name	Proximity		Posture		Facial Expression		Gesture		Eye Contact		Touch	
	+	-	+	-	+	-	+	-	+	-	+	-
S1	Few	Few	Few	Few	Many	Many	Few	Few	Many	Many	Few	None
S2	Few	Few	Few	Few	Many	Many	Many	Few	Many	Few	None	None
S3	Many	Few	Many	Many	Few	Few	Few	Few	Many	Few	None	None
S4	Many	Few	Many	Few	Many	Few	Few	Few	Many	Many	None	Few
R1	Few	Few	Few	Few	Few	Few	Few	Few	Few	Few	Few	Few
R2	Many	Few	Many	Many	Few	Few	Many	Few	Many	Many	Few	None
R3	Many	Few	Many	Many	Few	Few	None	Many	Few	Many	None	None
R4	Many	Many	Many	Many	Few	Many	Few	Many	Few	Many	None	None
R5	Few	Few	Few	Many	None	None	Few	Few	Few	Few	None	None
R6	Few	None	Many	Many	Few	Few	Few	Many	Few	Many	Few	None
R7	Few	Few	None	Many	Few	Many	Few	Many	Few	Many	Few	Few

S = small (n = 18 or fewer students)
R = regular (n = 24 or more students)

negative remarks with their students. Given previous research, one might expect that these students would feel more comfortable engaging in challenging tasks.

The overall climate of each classroom varied from teacher to teacher. There were regular-size classes where the teachers spent most of the communication time on issues related to behaviors and not related to the academic tasks to be accomplished. According to Borich (1996), the classrooms that were set up with the students sitting at individual desks that were segregated from one another were offering a competitive classroom climate. Activities that would be seen in those settings would be the drill and practice type of activities. In several of the regular-size classes, that is exactly what was observed. The students were sitting quietly, with no interaction encouraged between them. The teacher was the authority who presented the information and evaluated the responses.

The classes with fewer students had more room so children could move around the room. These children had opportunities to work together. Borich (1996) described the cooperative classroom climate where small and large group discussions were encouraged. The teachers in those environments did spend time encouraging interaction between the children. The children in the small-size classes were able to work together to formulate new ideas about their tasks. The small-size classes in this study were observed working in small groups with the teacher rotating among the groups facilitating the learning.

Molnar (1998) found that when class size is appropriate "(a) children receive more individualized instruction; (b) teachers can focus more on direct instruction and less on classroom management; (c) students become more

actively engaged in learning than peers in large classrooms; (d) teachers identify learning disabilities sooner, but fewer children end up going into special education classes because teachers can support them within small classes; (e) teachers are more able to give children from low-income families and communities a critical, supportive adult influence; (f) teachers are better able to engage family members and to work with parents to further a child's education; and (g) teachers of small classes less often burn out" (p.38). These findings suggest that smaller classes provide opportunities for the successful implementation of many elements that give students the most optimum conditions for education. According to Anderson (2000) "smaller classes provide opportunities for teachers to teach better; they do not cause teachers to do so" (p.22). The teachers of small-size classes observed in this study generally made remarks focused on more direct instruction and they spent less time on classroom management issues.

In the south Louisiana public school district where I live and work a strategic planning process was undertaken five years ago. After lengthy discussion among stakeholders including teachers, principals, supervisors, central office staff, parents, and community members, one of the goals identified for improvement was class size in the primary grades. Our plan was to begin with first grade ensuring that no class would have more than 20 children. The state of Louisiana funds teachers at a ratio of 26 to one per class. The first year alone that meant hiring an additional 23 certified teachers in our district. Some of

our schools with Title 1 funding had already elected to use their funds to hire teachers and create smaller classes.

The second year our district chose to include second grade. The third year third grade was included. During the third and fourth years additional funding was provided by the Department of Education. Kindergarten was added to the number for additional staff in 1999 when both kindergarten and first grade were kept at a class size of no more than 18 students with second and third grades having no more than 20 students. Currently, we maintain class sizes in kindergarten through third grade at no more than 20 students district-wide.

One of the greatest considerations throughout this process was facility. Were there classrooms to accommodate the extra classes? As new teachers were added the personnel director made calls to each principal asking if there were classrooms available to accommodate more teaching staff. In most cases, slight modifications in the use of space resulted in the addition of classes to provide for the smaller classes. We have used portable classrooms for many years to accommodate our students.

The issue of small class size in the primary grades is a topic of discussion in the yearly meetings of our principals' liaison committee. When the liaison committee meets with our superintendent to discuss the desires and needs of the schools in our district as a whole, the issue of small classes in the primary grades comes up again and again. Without exception maintaining smaller class size is the one topic that this committee of elementary, middle, junior high, and high school principals always lists as the first priority. In fact, one of the most vocal

individuals in favor of smaller classes in the primary grades is a high school principal. This focus has come after many years of education was provided to the teachers, staff, parents, and community stakeholders.

A trade off in one especially fast-growing area of our school district has been that small class size has been maintained as a priority even though other more slowly growing areas have added programs for four-year olds. The faster growing areas, not having enough empty classrooms, continue to have smaller class size in the primary grades, but no preschool classes have been added. Other areas have been able to add preschool classes. Through an ambitious building campaign, classrooms are currently under construction to accommodate this growth. Our constituents are proud of our district's academic success and show their support when a bond issue or renewal of tax funding is on the ballot.

The overall achievement of students in our district is high. In the spring of 2002 the State Department of Education for Louisiana published a ranking of each public school district. Our district of about 32,500 students was ranked number one in academic achievement in our state. At our school students continue to score above state and national averages on the Iowa Test of Basic Skills. The third graders in our district scored at the 70th percentile on the composite score of the ITBS in 2001 and at the 69th percentile in 2002. Our state average was the same as the national average of 50%.

The student attendance percentage in the elementary schools in our district was 95.5% in 2001-02. Certified teachers make up 98.2% of the teaching force in our district as compared to 89.2% in the state of Louisiana. Our district

has 15.5% Black students, 82.3% Caucasian students, and 2.1% of other minorities including Asian, Native American, Hispanic, and Pacific Islander. Our state has 47.7% black students, 48.9% Caucasian students, and 3.3% other minorities. Our district has 22% free lunch students, 5.5% reduced lunch students, and 72.5% of the students paying for their lunches. Our state has 50% free lunch students, 8.6% reduced lunch students, and 41.4% of the students paying for their lunches. As part of our state accountability program, schools are assigned a Performance Score based on norm-referenced tests, criterion referenced tests, dropout rate, and percentage of average daily attendance. Based on these factors our state average school performance score is 80.8 and our district school performance score is 109.7. The expenditure per pupil in our district in 2000-01 was $6,448.00 while the Louisiana state per pupil expenditure that year was $6,003.00. Our district has 47.7% of our teachers having a Master's Degree or higher. The state of Louisiana has 37.2% of the teachers having a Master's Degree or higher. (See Appendices).

Due to the smaller classes we are able to identify children with special needs expediently. All of our regular education classrooms are inclusion classrooms where students with special needs are placed with students not having identified specific needs. As the students are provided with the necessary tools needed for success in the classroom, they become independent learners capable of taking control of their own education.

Effective, dedicated primary teachers will always plan to promote the optimum learning environment for children. It is the role of school administrators to

provide for them the tools necessary to complete this tremendously important job. These teachers must not be burdened with so many students that they are unable to perform the job of teaching them and become hardened to the unachievable task they are asked to perform.

As the new high school graduates enter universities to become trained as the educators of the new generation of primary children, they enter the profession with a focus on the impact they can make to the future. We must continue to review studies on the impact of class size reduction and effective teaching on primary children. We must provide the new teachers with the training necessary to accomplish the job of educating our youth. But we can't stop with superb training and pre-service experiences for them. We have to continue by offering them support in classrooms. They should be able to create the environments where all our children will learn to be the best they can be.

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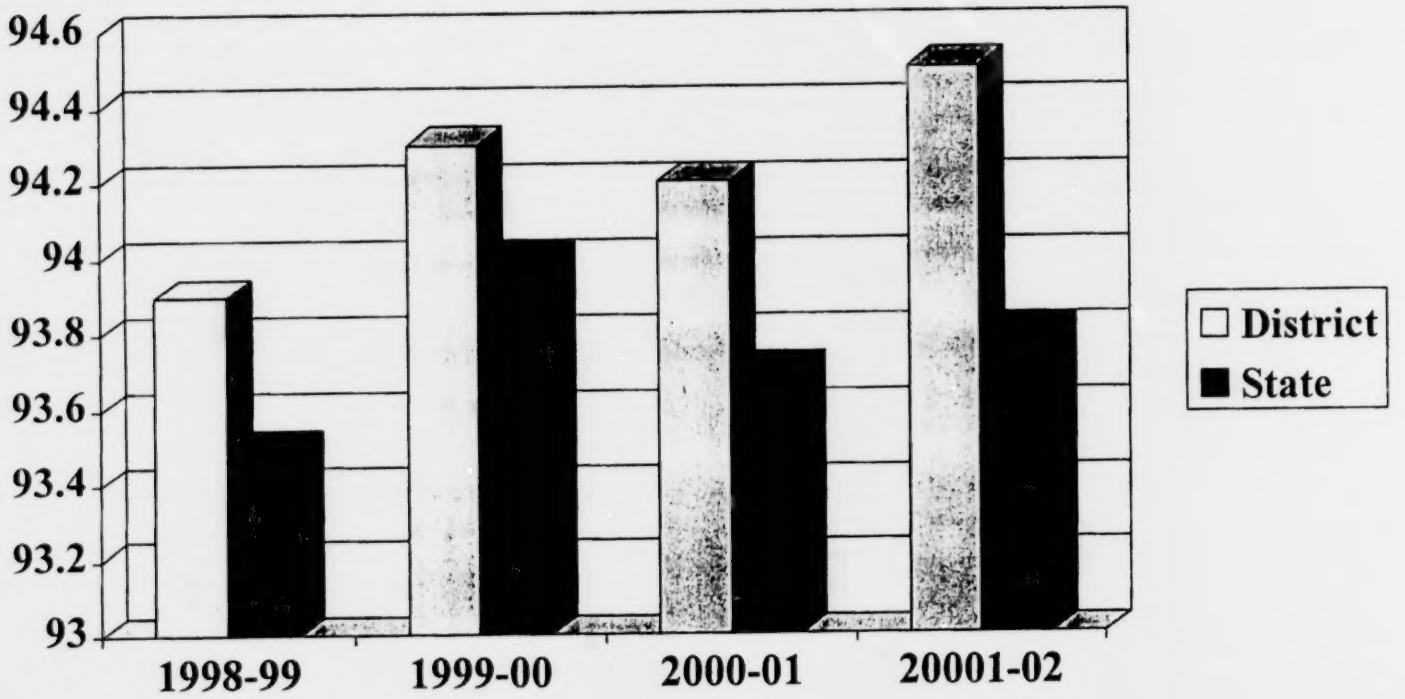
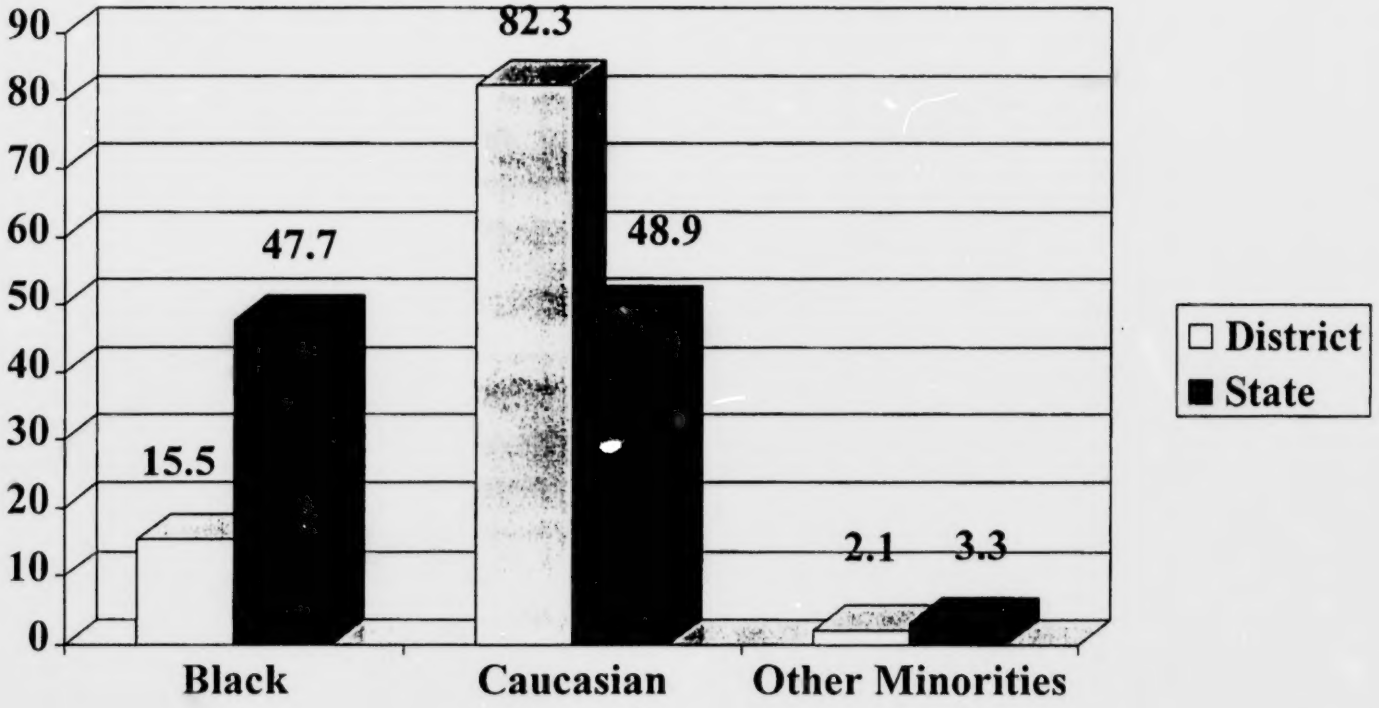
Student Attendance

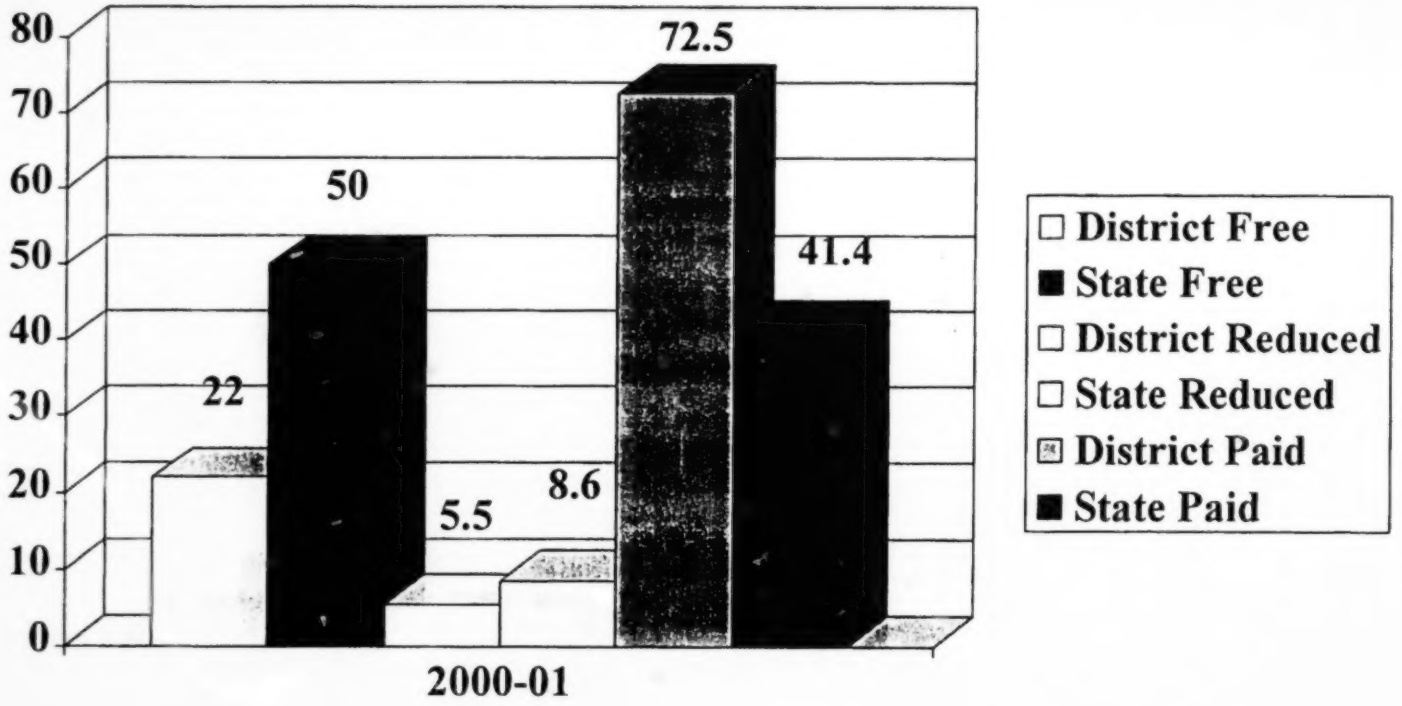


Appendix a

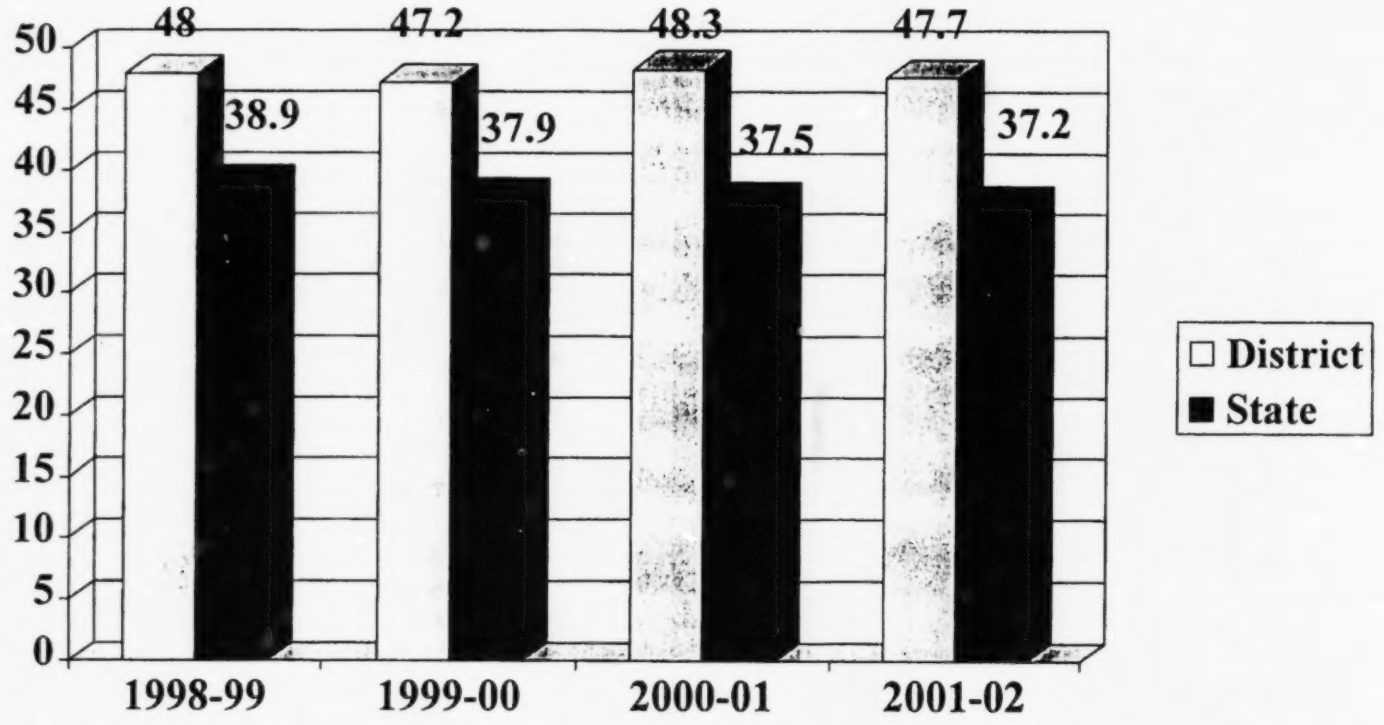
Student Ethnicity



Percent of Students on Free and Reduced Lunch 2000-01



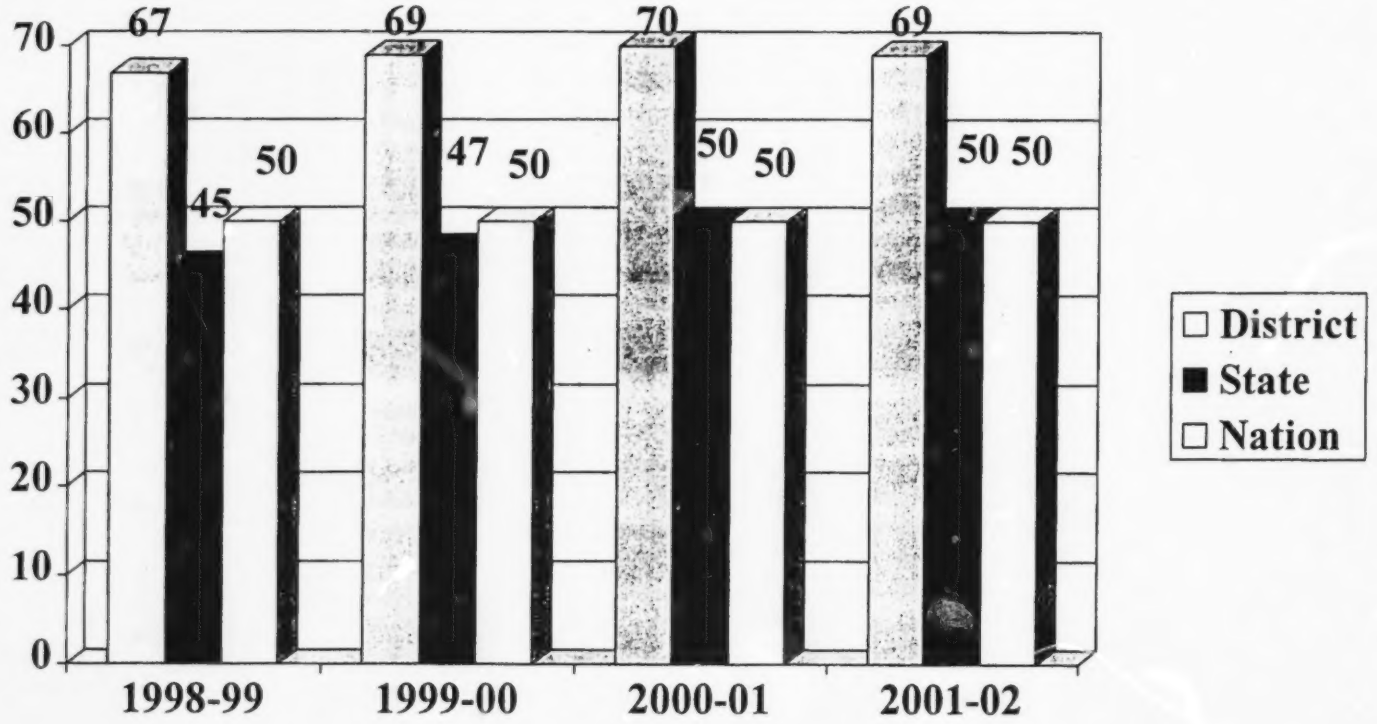
Teachers with Master's Degree or Higher



Appendix d

Student Achievement

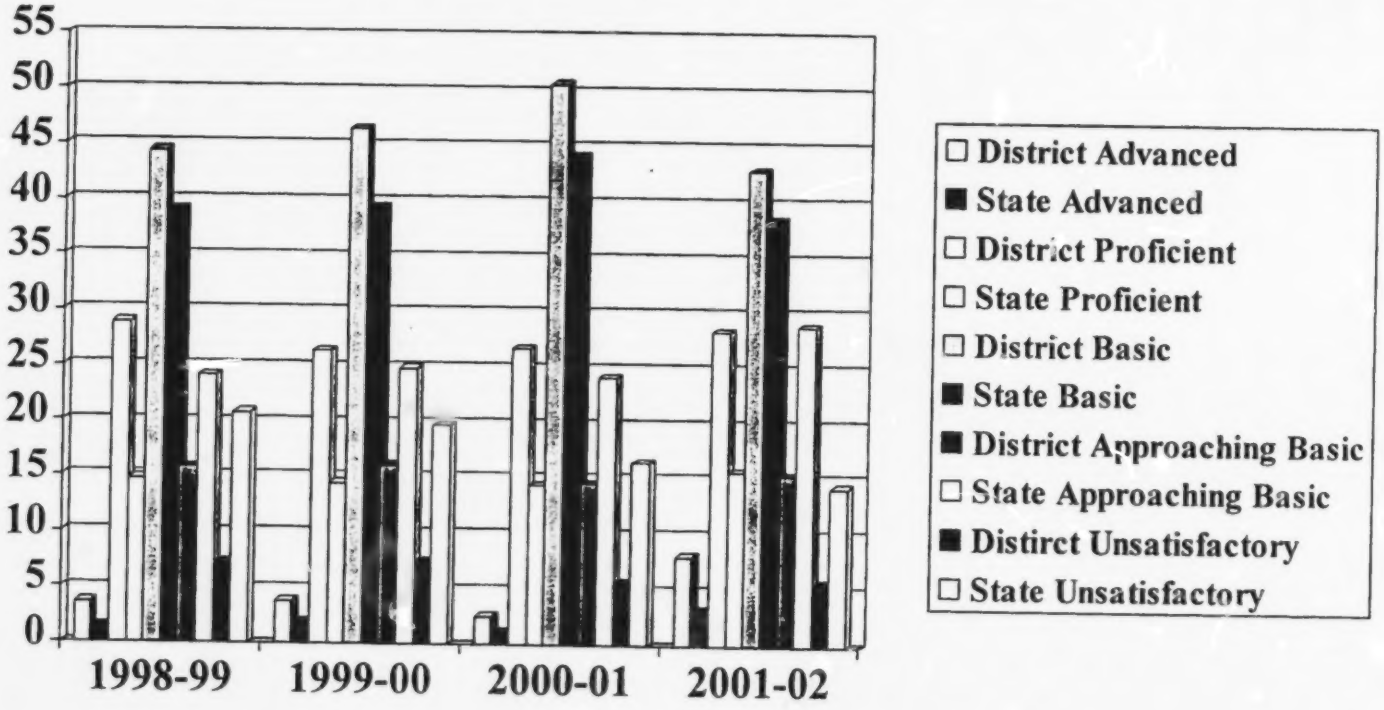
Percentile Rank Average Standard Score on Iowa Test of Basic Skills



Appendix e

Student Achievement

Percent of Students by Achievement Levels – Grade 4 - LEAP 21 – English/Language Arts



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